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Explosive Threats

Pentagon Still Playing Catch-Up With Bomb Makers

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Explosive ordnance disposal team leaders say their technology is behind the curve

The U.S. military's cadre of bomb disposal technicians needs lighter equipment, the ability to detect explosives at stand-off distances and their sensors consolidated into one handheld device. But most of all, they want to feel that their technology is putting them one step ahead of the insurgents who are planting the improvised explosive devices that are wounding and killing U.S. troops in Iraq and Afghanistan.

Instead — when it comes to tools that can defeat IEDs — the Defense Department has been playing a game of catch-up for the past 10 years.

"Our acquisition process inside the Department of Defense does not have the agility to keep up with our enemy's threat," said Capt. Dan Coleman of the Navy expeditionary warfare division and a former officer at the Joint Improvised Explosive Device Defeat Organization.

Requirements for defeating, detecting or protecting troops from IEDs must go through a bureaucratic approval process, the joint capability integration development system, fight for funding and then — after a long wait — the explosive ordnance disposal teams finally receive what they asked for, he said.

By that time, "our enemy is going to be three or four more ... cycles ahead of that solution that we have just fielded to the war fighter," Coleman said at a National Defense Industrial Association-Explosive Ordnance Disposal Memorial Foundation conference in Fort Walton Beach, Fla.

The number of EOD technicians is relatively small — about 5,500 spread out across the four services. Most of them "self-select" to join the units. Their deeds have been celebrated in the Academy Award-winning film, *The Hurt Locker*.

While they are few in number, their impact on the battlefield is crucial, said Army Col. Marue "MO" Quick, chief of the EOD and humanitarian mine action at the office of the secretary of defense's special operations/low intensity conflict division.

IEDs were the weapon of choice in Iraq, and the tactic has made its way to Afghanistan. In both wars, the majority of combat deaths and injuries are a result of these bombs, she said.

Meanwhile, in the 12-month period from May 2010 to this year's conference, 20 bomb technicians lost their lives in combat, and 94 were wounded, Quick said. EOD technicians have responded to some 112,000 calls for their services in Iraq and 45,000 in Afghanistan, she added.

While Quick, Coleman and other speakers said the long wars have resulted in EOD forces being the best equipped and most experienced since the specialty emerged during World War II, there is still a constant need to keep pace with new tactics being employed by the bomb makers.

"While we have made tremendous progress and significant improvements in equipment and training over the last 10 years, we must remain vigilant and focused in staying in front of the dynamic and evolving nature of our enemy's

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threat," Quick said.

Coleman put it in more blunt terms: "We can't go back to shooting behind the duck in terms of technology to defeat this IED threat."

The research and development community needs to get ahead of the curve and look at the potential ways enemies will use bombs in the future. As a Navy officer, for example, Coleman said he worries about submersible IEDs, a threat that has not emerged, but could someday.

"In the last 10 years we have come from being underfunded, under-resourced, and under-equipped to catching up to the fight," said Coleman. But that is what it is: a game of catch-up, he added.

Col. Dick Larry, chief of the adaptive Counter-IED/EOD solutions division at the Department of the Army headquarters, said, "Our adversary changes quicker than we do."

An insurgent "has no bureaucracy. He can do things much quicker than I can do. Whenever I come up with a new jammer, I've got to look three moves ahead. What have I forced him to do now that I have this new jammer?" said Larry.

The services' bomb technicians have several tools to help them with their inherently dangerous work. The radio-frequency jammers to which Larry referred prevent insurgents from detonating bombs through the airwaves. Bomb suits provide some protection in the event that an IED explodes. Robots can provide a view of a bomb from a safe distance, and their manipulators can sometimes be used to render them safe without the specialists needing to put on the cumbersome suits. Metal detectors have been around since World War II. Recently, ground penetrating radar, which can see nonmetallic shapes, have been integrated onto the metal detectors. Explosives used to detonate IEDs in a controlled manner are also employed.

EOD specialists also gather evidence that is turned over to units such as Joint Task Force Paladin, which goes after the networks of bomb makers and those who fund the operations.

The Afghanistan surge is an example of how the Defense Department is yet again playing catch-up with insurgents who use improvised explosives.

In Iraq, there was a nonstop, deadly game between the bombers, who constantly changed the types of detonation triggers, and organizations such as JIEDDO, which was stood up in 2006 to respond to the rapidly rising casualty toll. The triggers and bombs became more and more sophisticated. Simple command wires evolved to remotely controlled devices. When jammers were fielded, insurgents switched to commercially available technologies such as garage door openers which did not rely on radio frequencies. At one point, U.S. military officials counted 90 methods to trigger a roadside bomb.

Eventually, the explosives themselves became more potent. Explosively formed projectiles, designed to penetrate up-armored vehicles, arrived in theater.

As operations in Iraq drew down, and the Afghan surge picked up, the Defense Department's counter-IED enterprise was again behind the curve, several speakers at the conference said. Afghan insurgents turned the clock back and began employing "pressure plate explosives," or victim-activated bombs, an improvised landmine that relies on a person or vehicle stepping or driving on it to trigger the device. Jammers and command-wire detectors do nothing to defeat them. Tragically, Afghan civilians step on the mines as well.

"The threat is very complex in a rudimentary way. I'm not trying to be facetious when I say that," said Col. Leo Bradley, commander of the Army's 71st Ordnance Group at Fort Carson, Colo.

Afghan IEDs have a low metallic signature, often employing wood as a casing. They are not technologically sophisticated and use materials that are readily available, he said. They are difficult to find using standard mine detectors that seek out ferrous metals.

"While it looks crude, it's actually quite sophisticated and matched asymmetrically to what our detection capabilities are," Bradley said.

The explosives being used include a variety of ordnance, or homemade explosives with a variety of chemical signatures. The triggers "could be electronic or non-electronic. The list goes on and on and on," he added.

To develop sensors that can identify the key components is a tough technological challenge. "An improvised explosive device is just that, it's improvised. It doesn't have a standardized form. You have to be able to identify something that could look like anything ... It is a wicked problem."

The explosives are sometimes made from ammonium nitrate, a common fertilizer found throughout the region. It was most famously employed in the Oklahoma City bombing in 1995. Today, the chemical is banned in Afghanistan in an effort to reduce the amount of material on hand. How effective that ban is in a country where smuggling is rampant is unknown.

Sensors that can pick up nitrate-based explosives are relatively inexpensive and a mature technology. But a field covered

in fertilizer creates a lot of clutter. Navy Cmdr. Todd Siddall, deputy commander of Coalition Joint Task Force Paladin, the organization in charge of defeating bomb-making networks in Afghanistan, acknowledged that farmers still use it.

"Are they bad guys? No they are just out there trying to earn a living," he said.

EOD teams have not only had to contend with changes in enemy tactics, but those being ordered by U.S. Central Command. Navy Capt. Frederick E. Gaghan, chief of the technology requirements division at JIEDDO, said new counter-insurgency strategies that require troops to leave their vehicles and go on foot patrols, also caught the organization off guard. Dismounted operations have resulted in a higher casualty rate, he said.

"We are trying to respond to that," he added. "One of the issues we have had is trying to identify in advance what the war fighters requirements are," he said.

Siddall said there are now 14 different handheld devices fielded in Afghanistan used to detect improvised explosive devices. Most of them work well, but imagine a dismounted operation where an EOD team comprising three personnel must carry sensors, a small robot, plastic explosives used to detonate bombs they discover, a radio frequency jammer, not to mention food, water, weapons and ammunition, he said.

Sensors carried into the field include the metal detectors, ground-penetrating radar and a device designed to find hidden tripwires. With all that loading down EOD personnel, the 90-pound protective bomb suits are being left behind, said Siddall. Units have been given lighter robots, but they are not as capable as the larger models, he added.

Coleman said: "We have got to do everything we can to drive down that weight."

"We are backing into the future. We are meeting today's needs and today's gaps as best we can, but we're not looking over our shoulder to find out what tomorrow's fight is going to be," he said.

The EOD community will have to do this in a time of constrained resources, he added. JIEDDO, when he served there, could spend a lot of money to bring forth new counter-IED technology. It didn't matter how much it cost. Schedule was the primary driver. As long as a vendor could deliver a solution to solve a problem quickly, the funding was there. Now, with fiscal pressures, JIEDDO will be saying, "we need it now, but we won't be able to pay more," Coleman said.

Gaghan said JIEDDO will adapt accordingly as its fiscal situation changes. But he believed the organization will continue to exist as long as the improvised explosive threat is around. Globally, the scourge continues unabated, he noted. Putting Iraq and Afghanistan aside, there were about 400 IED incidents every month in 2010 with Pakistan, India, Somalia and Thailand topping the list. Put Iraq and Afghanistan back into the equation, then there were more than 11,500 incidents last year, Ghagan said.

As for responsiveness, JIEDDO does have special working groups that look at future and emerging threats such as the use of lasers as triggering devices, various maritime IEDs "and other things we can't discuss," he said.

He pointed to statistics that indicated that JIEDDO's efforts in Afghanistan are having an impact. While the number of bomb emplacements from October to May held steady, the number of "effective" attacks — ones that caused harm — dropped from 21 percent to 16 percent. While that may not seem like a large decrease, "The drop in a single percentage point means someone is coming home safe," he added.

Meanwhile, JIEDDO has put out a request for information for robots that can move ahead of dismounted troops and trigger pressure plate explosives before they can do harm. The organization is trying to leverage work done by several Defense Department labs that have developed leader-follower drones designed to carry equipment. It wants to know if this work could be adapted for robots that would move ahead of foot patrols instead of following them. But he acknowledged that fielding such a capability would take many months.

A vendor who asked not to be named because his organization is responding to the RFI, said it will be a hard problem — especially if these robots are intended to be expendable and therefore, inexpensive. A typical ground robot also would either have to be heavy enough to set off an improvised landmine or have some kind of attachment, like a mallet, that would pound the ground.

To get ahead of insurgents' changing tactics, Edwin Bundy, program manager for EOD programs at the office of the secretary of defense's combating terrorism technical support office, said he is looking at an Australian program that organizes "fly-away" teams. When a new IED threat emerges, a group of experts is assembled that can travel quickly to investigate and determine what possible solutions can be applied to neutralize the problem.

They can bring back technical requirements based on the operational context that the bombs are in. For example, soil conditions are a factor when it comes to rendering roadside bombs safe. A soil expert could be part of the team.

They may know of a technology that could provide an 80 percent solution in the short term. They also would know what existing technologies are out of reach.

"We would all love to have Tricorder but that is a long ways off," Bundy said.

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